

want the bottom line — Type II restriction enzymes. Somewhat surprisingly other enzymes are sort of ho-hummed, even though a famous scientist reminded Chérfas that those enzymes are important. Clearly the author is not to be deterred by this kind of fact — he prefers conversation.

Speaking of important facts, there is the description of the preparation of a recombinant phage library (p.113):

Once the phage had grown and amplified their precious cargo several hundred times, the agar was scraped off the plates and mixed with a little chloroform to ensure that the cells that had not yet burst to release their phage would do so. The whole lot, about one third of a litre, was spun in a centrifuge to remove bits of agar and cell debris, and popped into the freezer for storage: a small jar, holding the entire human genome as a collection of handy, ready to use pieces.

It was prose like this that caused me to fail Freshman English composition. And, continuing his interpretation at the undergraduate level of understanding, we find (p.51) that DNA electrophoresis on agarose was a major scientific advance because it avoided adjusting solvent concentrations of column fractions obtained during enzyme purification. And to validate the importance of this last breakthrough we have a direct quotation from a letter to Chérfas (p.52), to wit:

'Agarose gel electrophoresis did not originate with our *Biochemistry* paper', Sharp has told me, 'but was certainly popularized by it.'

There is a lot of silly conversation in this book, and terms such as Frederick's ladder and Walter's cookbook are not the silliest.

One might also question some of the value judgements. There are several references to the tedium of protein purification, and on p.145 we learn that because of genetic engineering of DNA ligase genes "the tedium of protein purification became much more worthwhile. . .". Aside from the questionable logic, I imagine that those who purify proteins find it a rather stimulating and useful occupation.

I would guess that my reaction is partly cultural, since Americans expect citizens of Great Britain to write and speak in good English, often mistaking a clipped accent for a sign of intelligence. In the present instance the familiar presentation of questionable facts may make this book popular with academic camp followers, but our new generation cloners and budding venture capitalists will probably look elsewhere for the hard facts of recombinant DNA technology. □

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Darwinian delicacies

Colin Patterson

Hen's Teeth and Horse's Toes: Further Reflections in Natural History.

By Stephen Jay Gould.

W. W. Norton: 1983. Pp.413. \$15.50.

REVIEWING Stephen Gould's essays, I was tempted to begin, as he so often does, with a snatch of libretto or a quote from a favourite sage. But I resist the temptation; as with top-class cooking, it may be easy to identify ingredients, but what is put on the table has been transformed in an inimitable way.

Hen's Teeth and Horse's Toes is Gould's third collection of essays, following *Ever Since Darwin* (1977) and *The Panda's Thumb* (1980). As before, almost all of the pieces first appeared in *Natural History*, the monthly published by the American Museum of Natural History. Two of the thirty essays are from other sources, a trifle on the evolution of Hershey bars, and one of a trio on the creationist revival. There is one new piece, a reply to critics of Gould's thesis that Teilhard was in on the game at Piltown.

Gould's themes range from the topical (sociobiology, creationism, a terminal Cretaceous asteroid impact), through the historical (Cuvier, Agassiz, Vavilov), to the timeless "is Darwinism enough?". Evolutionary theory is his concern in most of these essays, and he comes at it from all

sides. Gould's own answer to the question about Darwinism is "no". He advocates a pluralistic and hierarchical theory, with junk DNA and neutralism active at the molecular level, neo-Darwinism at the intraspecific level and as the explanation for finely-tuned adaptation, but *not* for the origin of species or of all novelty. Species may frequently arise by chance events, and randomly generated species form the raw material of species selection, a process analogous to natural selection, but acting at a different hierarchical level. Evolutionary novelties may not be ground out by slow mill of natural selection, but generated instantly by changes in ontogenetic control, like atavism and homeosis. And the box is shaken now and again by random catastrophes such as asteroid impacts or continental collisions.

Whether or not you agree with Gould, you will surely enjoy and admire the vigour of his style, his agile and fertile mind, and his protean scholarship. Who else could spin a couple of thousand entertaining and provocative words from themes as unpromising as the census, or Steno's views on solids within solids? Only one rival comes to mind, T.H. Huxley, who did the same with "Yeast" and "A Piece of Chalk". I don't know how Steve does it, but I hope he keeps it up. Together with his many other fans, I look forward to the fourth collection. □

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